ΗΧΩΚΑΡΔΙΟΓΡΑΦΙΑ ΚΑΙ ΑΛΛΕΣ ΑΠΕΙΚΟΝΙΣΤΙΚΕΣ ΤΕΧΝΙΚΕΣ. ΜΙΑ ‘ΣΧΕΣΗ’ ΠΟΥ ΔΟΚΙΜΑΖΕΤΑΙ

Διάγνωση, διαχείριση ασθενών με ενδοκαρδίτιδα το 2018. Τι νεότερο. Η άρα της ομάδας;

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ΔΕΝ ΥΠΑΡΧΕΙ ΣΥΓΚΡΟΥΣΗ ΣΥΜΦΕΡΟΝΤΩΝ
Introduction

• The landscape of IE is changing
  - older patients
  - more procedures
  - more prosthetic devices and material

• Remains a diagnostic and treatment challenge

• A favor outcome depends on
  - rapid diagnosis
  - precise risk stratification
  - competent treatment and follow up

The role of imaging

- Diagnosis
- Prognosis
- Identification of cardiac complications
- Control of response to treatment
- Peri-operatively
- Follow up after the completion of treatment

Habib G et al. EHJ 2015; 36: 3075-3123
Indications (TTE and/or TOE)

TTE is the imaging method of choice upon IE suspicion

- In case of negative TTE, a TOE is performed upon IE suspicion
- In case of positive TTE → TOE (size of vegetations, high risk characteristics, abscess)
- TOE upon persistent fever in a patient with prosthetic valve or pacemaker
- In case of new onset HF, new murmur, embolic incident, A-V block
- After successful treatment
- Before discharge
- Peri-operatively
- Follow up
Prognostic Factors

Patient’s characteristics
→ Age, DM, prosthetic valve, comorbidities

Presence of Complications
→ CVA, Heart Failure, septic shock, perivalvular complications

Type of microorganism
→ Staph. Aureus, Fungi, Gram(-) bacilli

Specific Echo findings

Habib G et al. EHJ 2015; 36: 3075-3123
Echocardiographic Risk Factors

- Position, Size and mobility of the vegetations
- Severe native valve regurgitation
- Severe dysfunction of prosthetic valve
- Perivalvular abscess
- Prosthetic valve dehiscence
- Severe pulmonary hypertension
- Reduced EF
- Early mitral valve closure (high diastolic pressures)
Mobile vegetations of > 10 mm are associated with new embolic strokes and are a prognostic factor of mortality in 6 months

Hill EE Eur J Clin Microbiol Infect Dis 2008
Thuny F et al Circulation 2005

The anterior mitral leaflet vegetations have the highest embolic risk

Vilacosta I et al J Am Coll Cardiol 2002

The mobility of the vegetation is a very strong predictive index of a new embolic event

Hill EE Eur J Clin Microbiol Infect Dis 2008
Severe valve regurgitation in a native valve
Perivalvular Abscess

Aortic Valve IE is an independent prognostic factor of perivalvular abscess

G. Nadji et al Eur J Heart Failure 2009:11

Perivalvular abscess is a strong prognostic factor of in-hospital mortality

New dehiscence of a prosthetic valve is a strong predictor of mortality (rocking motion)

*Habib G et al, Heart 2005;91*
Prosthetic valve endocarditis is the 10-30% of all IE cases

Habib G et al Prog Cardiovasc Dis 2008;50

Metallic and bioprosthetic are affected equally

Habib G et al Eur Heart J 2009

Advanced stage, early IE (< 1 year after operation, Staph infection and complications i.e. HF, CVA, abscess) are prognostic factors associated with poor prognosis

The number of device implantations has increased (x 2-3) over the last 10 years, along with the rate of CDI

Johansen JB et al, Eur Heart J 2011;32:991–998

Samartin RC et al, Rev Esp Cardiol 2012;62:1450–1463

Almost 40-50% have additional valve infection and approximately 20% of cardiac implantable electronic device (CIED) infections are lead associated endocarditis (LAE)

Athan E et al, JAMA 2012;307:1727–35

LAE has a 1-year mortality of 12% for pocket infections and 25% for endovascular infections


TOE (particularly 3D) is essential to visualize all parts of the leads, especially close to the superior vena cava

In CDI, the sensitivity of TOE is much superior than TTE (80-90% vs 20-30%)

The modified Duke criteria have a sensitivity of 80% when evaluated at the end of follow up. (Habib G et al, J Am Coll Cardiol 1999)

Even lower diagnostic accuracy when early diagnosis is to be confirmed or when PVE or LAE is present. (Hill EE et al Am Heart J 2007;154:923–928. Vieira ML et al Heart 2004;90:1020–1024)

Recent advances in imaging have improved IE identification and thus increase the Duke’s criteria sensitivity. (Bruun NE et al Eur Heart J 2014;35:624–632. Thuny F et al Arch Cardiovasc Dis 2013;106:52–62.)
CT and CARDIAC CT

• MSCT can be used to detect abscesses / pseudoaneurysms with a diagnostic accuracy similar to TOE but superior in evaluating the anatomy and the extent of the complications


• It may be superior than TOE in evaluating PVE and especially in heavily calcified fields

  Hekimian G et al Heart 2010;96:696–700

• In critically ill patients may be more feasible than MRI in detecting cerebral infarcts and lesions

• MRI increases the likelihood of detecting cerebral consequences of IE.

• Different studies including systematic cerebral MRI during acute IE have consistently reported frequent lesions, in 60–80% of patients

  *Snygg-Martin U et al Clin Infect Dis 2008;47:23–30*

• Systematic cerebral MRI has an impact on the diagnosis of IE (minor Duke criterion)


• Cerebral MRI is, in the majority of cases, abnormal in IE patients with neurological symptoms

  *Iung Bet al Stroke 2013;44:3056–3062*
F-FDG PET

- Can detect inflammation before structural changes, needed for the echocardiographic verification of the diagnosis, occur.


- The 3-months interval used in the guidelines is arbitrary.

  Scholtens AM et al J Nucl Cardiol 2017

In patients with CDI diagnostic sensitivity and specificity of 89 and 86% respectively are reported:


(A) Small thickening around the bioprosthetic annulus
(B) Periprosthetic abscess
(C) Hyperfixation around the prosthesis

99mTc-HMPAO-WBC scintigraphy reliably excluded device-associated infection during a febrile episode and sepsis, with 95% negative predictive value

*Erba P et al, J Am Coll Cardiol Img 2013;6:1075–86*

Its high negative predictive value can be used as a sequential strategy comprising both modalities.

*Swart L et al, EHJ 2018;39:3739-3749*
THE ‘ENDOCARDITIS TEAM’

- IE is a disease that needs collaborative approach
  - Not a single disease but may present in very different aspects
  - Very high level of expertise from practitioners from several specialties is needed
  - 50% of the IE patients undergo surgery during the hospital course. Early discussion with the surgical team is mandatory.

- Implementation of the ET reduced 1 year mortality from 18.5% to 8.2%

- Class IB in AHA/ACC 2014 guidelines
  - Nishimura RA et al JACC 2014;63:2438-2488
Conclusions

• Echocardiography remains the imaging cornerstone of IE diagnosis and management

• The sensitivity of the Duke criteria can be improved by novel imaging modalities (CT, PET-CT, MRI)

• The role of the endocarditis team is fundamental.

• Its clinical judgement cannot be replaced.
ΕΥΧΑΡΙΣΤΩ ΠΟΛΥ